Construction Sustainability & Awareness amongst Contractors in the Northern Region of Malaysia

Ahmad Yusni Bahaudin[#1], Ezanee Mohamed Elias[#], Mohd. Nasrun Mohd. Nawi[#], Nizamuddin Zainuddin[#], Santhirasegaran Nadarajan[#]

[#] *School of Technology Management and Logistics, College of Business, University Utara Malaysia, 06010 Sintok, Kedah, MALAYSIA*

[1]b.yusni@uum.edu.my

Abstract **−The level of awareness of sustainable and green practices in construction projects in Malaysia is still unsatisfactory. Even though it is increasing, the response and progress rate should be made higher to meet global standards. Sustainability in construction brings uncountable benefits to the social, environmental and economic sectors. This type of construction approach should be taken seriously as 24% of the total carbon dioxide is produced from the construction industry in this country. The aim of this research is to promote a sustainable environment in the construction proximity. Therefore, the objective of this paper is to investigate the level of commitment contractors in the northern part of Malaysia have, with regards to sustainable and green construction practices. The level of collaboration between the government and private sector will also be investigated. To investigate the degree of appreciation, a general interview guide approach with qualitative analysis is utilized as it allows the collection of general information from the interviewees. There are a number of green building rating tools being developed by various organizations in Malaysia, however, for the purpose of this research, only the GBI will be considered during analysis. It is found that less than one percent of construction projects in Malaysia are certified as green and sustainable. It is therefore recommended that in future researches, a broader spectrum of respondents should be investigated.**

Keywords− *contractors, green construction, private sector, sustainability*

1. Introduction

Sustainable and green construction can be defined as an effort to reduce the harm of construction activities to the environment for improved quality of human life and protect the natural surroundings by efficient use of resources and avoidance of resource depletion. Green and sustainable construction issues are earning more solicitude worldwide as the construction industry is the heaviest consumer of natural resources which would bring harm to the environment. According to a study conducted by Global Green of USA, 40% of the world's natural resources and non-renewable energy resources used is related to the construction and building maintenance activities. Indeed, the construction industry is among the biggest contributors to environmental pollutions, waste and acceleration of global warming. The aim of this paper is to promote a sustainable environment in the construction proximity. Thus, the objective of this paper is to investigate the level of commitment by contractors in the northern states of Malaysia with regards to sustainable and green construction practices. The level of co-operation between the government and private sectors will also be investigated. The prompt growth of the construction industry brought undesirable influences to the environment. Uncontrollable construction will lead to energy waste, physical destruction, environment pollution, high energy consumption and cause health problems if improper materials are used. However, the progress and advancement of Malaysia in green and sustainable construction are far beyond the expected time. The conventional construction activities lead to resource deterioration, chemical pollution, physical disruption and flash flood as in Klang Valley and Kuala Lumpur. Therefore, the implementation of sustainable and green construction is desired to mitigate the environmental problems caused by construction and development activities.

2. Literature Review

Green buildings are primary sustainable and sustainability is part of the Malaysia New Economic Model that supply to continuing growth emphasized under the Malaysia Construction Industry Master Plan (2005-2015) [1]. To promote balanced sustainability in construction, three principles are governed for a

International Journal of Supply Chain Management
IJSCM, ISSN: 2050-7399 (Online), 2051-3771 (Print)

greener construction: environmental, social and economic [2]. There are various programs, policies and tools available in Malaysia for developing sustainable and green construction industry (See Figure 1).

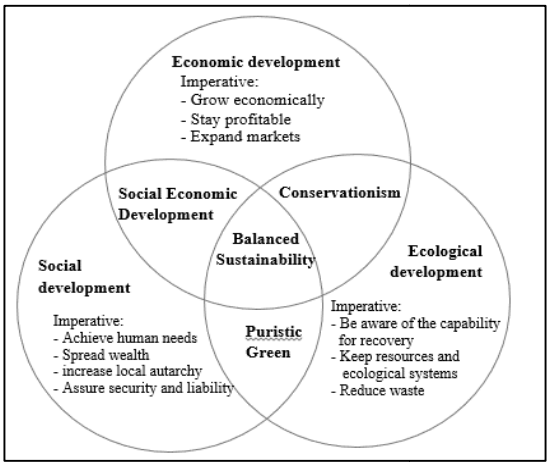

Figure 1. The Relations of Three Principles of Balanced Sustainability

2.1 National Green Building Rating Tools & Rating System

There are several rating tools and rating system in the country. The most widely utilized is the Green Building Index.

2.1.1 Green Building Index (GBI)

The Green Building Index or GBI is initiated by the Malaysian Institute of Architects (PAM) and the Association of Consulting Engineers Malaysia (ACEM) in 2009. GBI is a green rating tool which was designed specifically for the Malaysia's tropical climate, current economic, infrastructure and social development (GBI.org, 2016). The GBI award is given based on the GBI points obtained [3] as shown in Table 1. The GBI green building rating tool were developed to sustain and at the same time to improve human life whilst maintaining the capacity of the ecology and the environmental or the ecosystem at the domestic and international levels.

Table 1: GBI Ratings and Awards

GBI Points	Awards
86 and above	Platinum
76 to 85	Gold
66 to 75	Silver
50 to 65	Certified

The GBI Award Ratings is based on calculations which are based on 6 main criteria. These are Energy Efficiency; Indoor Environmental Quality; Sustainable Site Planning & Management; Materials & Resources; Water Efficiency; Innovation.

The Cyberjaya Mosque which is GBI certified is equipped with the Building-Integrated Photovoltaic System to harvest solar energy was awarded with a platinum GBI-rating building. Any green building awarded are purposely built to harmonize with the local climate and surroundings as in the case for Malaysia, where the climate is hot all year and at times with heavy rainfall for a couple months. It also integrates with the local traditions and air flow circulation that are strongly driven by Malaysian cultures and the surrounding environment. The Sime Darby Idea House (also GBI certified) which is located at Shah Alam, Malaysia is one of the best architectural creation and the first carbon -neutral house in South-East Asia.

*2.1.2 Malaysian Carbon Reduction & Environmental Sustainability Tool (*My*CREST)*

MyCREST was introduced jointly by the Construction Industry Development Board (CIDB) and the Public Works Department (PWD) Malaysia. It is aimed to lead, support, measure, and decrease the constructed environment's effects in order to reduce environmental influence and carbon emissions, and considering a more holistic life-cycle vision of the built environment. It also reduce carbon emissions and environmental impacts, while taking into account a more holistic life-cycle view of the built environment. MyCREST encompasses three basic tools, and a "scoring plan" to assess a building for certification: design tool, construction tool, and operation and maintenance tool [4]. MyCREST has been made a compulsory requirement for government projects which value more than RM50 million.

2.1.3 Green Real Estate (GreenRE)

Green Real Estate (GreenRE) is designed for the construction sector and real estate. The purpose is to enhance and encourage the involvement of industry professionals. GreenRE provides efficient solutions for green certification at affordable costs. The experts are advised to design and build sustainable and green building with integrated method. It's targeted at promoting better adoption of green technology and practices amongst the Malaysian Real Estate organizations [5].

2.1.4 Green Performance Assessment System in Construction (Green PASS)

Green Performance Assessment System in Construction (Green PASS) was developed by CIDB which is an independent construction regular, which rates and measures the effect of structures and their construction upon the atmosphere. The objective of Green PASS is to establish a robust and reliable database on carbon emissions of construction. It estimates the carbon footprint of building construction works throughout its life cycle. It also provides a framework which links sustainability with performance to drive towards green and sustainable construction [6]. Green PASS however is now being superseded by MyCREST.

2.2 National Sustainability Efforts & Incentives

There are some efforts by the government to encourage clients, developers and contractors to practice green and sustainable construction

2.2.1 Industrialized Building System (IBS)

Industrialized Building System is a sustainable approach to green construction. It is a construction method in which elements are created in an organised environment (on-or-off site), transported, located and assembled into a building with slight added site works. Malaysia has recognized the need for developing IBS in early 1960's. As early as 1999, Malaysia adopted IBS Strategic Plan. Then, IBS Roadmap was established for 2003 to 2010 [7].

2.2.2 Tax Incentives

The government has applied an instrument to cultivate the green building investment which is introduced green tax exemptions and reductions, and investment incentives. Some of the incentives are the corporate tax incentives for organizations conserving and generating renewable energy (by using biomass, hydropower and solar power) as well as organizations that offers well-organized energy conservation facilities. Company tax incentives for generation of the renewable energy source for self- utilization and income-tax and stamp duty incentives for GBI certified buildings.

2.2.3 Site Waste Management Plan (SWMP)

National Strategic Plan for Solid Waste Management (SWMP) was adopted in 2005 until 2020 to form the base for solid waste management strategy and practice in peninsular Malaysia. Since building materials costs are relatively low in Malaysia, therefore the waste minimization, reuse and recycle practices are limited [8].

2.2.4 Lean Construction (LC)

Lean Construction or LC is aimed at decreasing waste, growing productivity, health and safety in achieving the client's requests. LC is able to reduce the overall cost while maintaining the quality and shorten the manufacturing cycle time. LC also has a clear set of objectives which is aimed at maximizing the performance for the end user at the project level.

3. Methodology

The methodological approach utilized in this research is qualitative. A general interview guide approach is used as it allows the collection of general information from the interviewees. The respondents are practitioners of construction projects from the northern states of Malaysia. The interviews are aimed at finding out the level of participation and involvement private sectors have in sustainable and green construction. The interviews were tape recorded and transcribed, qualitatively analysed and converted to text. The secondary data used to assist in completing this paper were online journal, official websites, magazines, books and certified statistic reports are exploited

4. Data Analysis

According to the respondents, none of them is applying green construction technology in their construction projects. They have basic knowledge about sustainable and green construction and understand the importance of green construction, however they do not practice nor apply them in their projects.

The main reason for them not to consider sustainable and green construction is, the upfront cost is expensive and affect their profit margins. They understand that the green construction technology such as IBS might help them in cost savings in the long term, however the profit gained from conventional construction practices is more satisfactory, hence, and they are not planning to consider green construction and sustainability practices at this stage. Besides that, the problems of shortage of expertise and skilful knowledge prevented them from considering green construction, although CIDB launched various programs related to green construction and

sustainability. For instance, the geo-structure of one of the northern regions, as in Alor Star, brings fear to the construction participants to implement the green construction methods as they were worried about the feasibility of green construction in their area.

The majority or almost all of the construction projects prefer to use unskilled labour intensive (foreign workers employment) as they are cheaper compared to local workers. In neighbouring countries like Hong Kong and Singapore, where they pay higher wages to their unskilled labour, the application of green practices in their construction industry is justified. Locally, the construction participants are comfortable with the conventional methods as a sufficient profit margin is somehow guaranteed. The availability of the facilities for green construction sustainability is somehow limited Even though the construction participants would like to implement IBS in their projects, the cost of transportation of the pre-cast products from the other states to their site might be costly and increase their budgets. Moreover, the green-label construction materials are limited and the construction parties might have to import the materials from overseas and this does not carry economic benefits to them. Furthermore, they do not consider the tax exemption and incentives provided by government to those GBI-certificated projects as beneficial and advantageous to them. Providing subsidies to encourage the clients and developers to get involved in sustainable and green construction will be a more practical alternative.

Generally, the respondents held a pessimistic assertion for the implementation of green and sustainable construction in Malaysia. The buying power of customers is comparatively lower than previously and instead of allocating the money to investigate construction sustainability, they rather invest in more budgeted and affordable construction projects. Green construction might be helpful in cost savings in the long term, but the respondents indicated that they will not adopt it at present .The efforts of the government is significant and essential in promoting green construction and sustainability. The respondents suggested that more IBS factories to be built so that materials are easily accessible and experienced and professional experts are utilized to promote sustainability. A research was done to investigate the number of green construction projects in Malaysia. The result shows that the application of sustainable and green construction technology is northern Malaysia is disappointing.

Table 2. The Distribution of Construction Project

Number of Projects	2015	2016
Total Construction Projects	40169	29751
GBI-Registered Projects	70	42
GBI-Certified Projects	70	27

Table 2, it shows the total number of construction projects in Malaysia for year 2015 and 2016. There are 40169 construction projects for year 2015, however, only 70 or 0.17% of the projects were registered with Green Building Index (GBI) and all the registered projects have been certified. As of third quarter or September of year 2016, Malaysia has 29751 construction projects, only 42 or 0.14% projects were registered with GBI. Among 42 GBI-registered projects, only 27 projects have been certified.

5. Discussions and Conclusions

It could not be denied that the government is putting a lot and undivided efforts in promoting sustainable and green construction. Several projects and tools are introduced to encourage more private organizations to participate in this global trend. However, the progress is gradual. The main objective of the private sector is profit. Their main concern is how much profit they can make but not the environmental problems, although they understand the impacts of construction activities on the environment. But this does not mean that the authorities and private sectors could not cooperate. In fact, they should collaborate as a team to achieve their own goals. The authorities should not give up but continue promoting sustainable and green construction which definitely will take time and it is a long term commitment. Financial incentives such as tax reduction or existing tax exemptions should also be reviewed and adjust to meet requirement of the public sector as this is the best way to increase uptake [8]. Government financial incentives have a significant role to provide risk-less and affordable financial resources for green developers [9].

Besides, the government should make sustainable and green construction compulsory progressively. For example, by displaying the energy performance rating on buildings as being done in the United Kingdom [10]. Furthermore, the awareness for environmental concern should be elevated. Although most of the roles of the construction industry have cognition about green construction, there is still a wide space to stride. The environmental considerations should be integrated

into every phase of the construction project, and encourage engagement of all team members from the initiation to the completion of the projects [7], [10], [11], [12].

In addition, to implement sustainable and green construction in Malaysia, the authorities and capable private organizations should collaborate technology transfer from developed neighbouring countries, since they have the same climate and surroundings. Invitations of experts from a developed country is a good practice. They might introduce new concepts and ideas to boost up our progress in sustainable and green construction. Everyone in the country should be educated about the significance of sustainable and green construction, not only in higher education organization, but also primary schools. Research and innovation is the best approach to further champion the cause for sustainability. The government has set a considerable amount of allocation to accelerate research, development and innovation.

Academicians locally and abroad are encouraged to propose researches in sustainable construction and utilize this opportunity to do more research and innovation to stimulate the green and sustainable construction practices. Sustainability should be adopted in the curriculum in schools and universities as an endeavour to increase awareness.

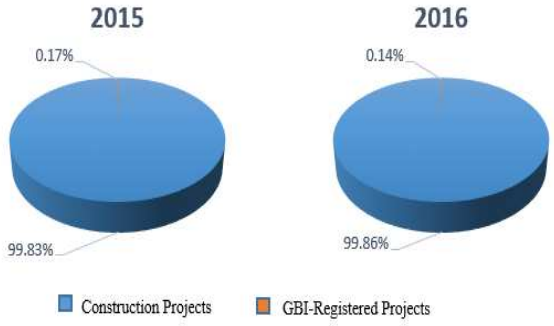

Figure 5. The Confrontation of GBI-Registered Projects and Construction Projects

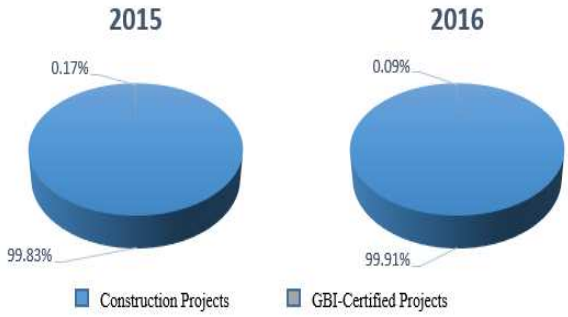

Figure 6. The Confrontation of GBI-Certified Projects and Construction Projects

Figure 5 and 6 shown the real scenario in Malaysia where the status of green and sustainable projects for buildings and residential buildings are not as expected. The lack of awareness among clients, developers and contractors in Malaysia are shocking. For example, in 2016 there are only 0.14% out of 100% construction projects registered are awarded the GBI certified. However, when the projects are completed, only 0.09% of them are then awarded as the GBI certified. The outcome of this research revealed that the number of GBI-registered and certified projects are appalling and the authorities should rectify this problems as soon as possible. The collaboration amongst government and private industry is important to stimulate the practices of green and sustainable construction. The environmental problems caused by construction are unrecoverable and might endanger mother earth in the long term. By practicing green and sustainable construction, the sustainable balance between economic, social and ecologic can be achieved.

References

[1] Hamid, Z. A. "*Creating sustainable green construction in Malaysia"*. The 3rd Annual Affordable Housing Projects in Kuala Lumpur, July 2012 Asia-Pacific, (July), pp. 24–30. 2012.

[2] Nazirah Zainul, A. "*Environmental Concerns in Malaysian Construction Industry"*. Malaysia, Pulau Pinang: Penerbit Universiti Sains Malaysia, 2010.

[3] Jamilus, M. H., Ismail, A. R., & Aftab, H. M. "*The way forward in sustainable construction: Issues and challenges"*. International Journal of Advances in Applied Sciences, vol. *2*(1), pp. 15–24. 2013.

[4] CIDB. "*CIDB programmes in Green Technology. Technology & Innovation Development Sector"*, pp. 1–22, 2009.

[5] Greener buildings. http://www.amazon.co.uk/Greener-Buildings-Environmental-Property-surveying/dp/0333574540. 2016

[6] Hamid, Z.A, Noor, M. S. M., Kamar, K. A. M., Ghani, M. K., Zain, M. Z. M., and Rahim, A. H. A. *"The Way Forward of Sustainable Construction and Green Technology in Malaysia."* Management in Construction Researchers Association 9th Annual Conference and Meeting (MiCRA 2010), pp. 155-166, 2010.

[7] Kamar, K. A. M., & Hamid, Z. A. "*Sustainable construction and green building: the case of Malaysia"*. WIT Transactions on Ecology and the Environment, Vol. 167, pp. 15–22, 2011.

[8] Papargyropoulou, E., Preece, D. C., Padfield, D. R., & Abdullah, A. A. B. "*Sustainable construction waste management in Malaysia: a constructor's perspective. Management and Innovation for a Sustainable Built Environment"*, pp. 1–10, 2011.

[9] Samari, M., Godrati, N., Esmaeilifar, R., Olfat, P., & Shafiei, M. W. M. "*The investigation of the barriers in developing green building in Malaysia"*. Modern Applied Science, Vol. *7*(2), pp. 1–10, 2013.

[10] Yellamraju, V. *LEED-"New Construction Project Management (GreenSource)"*. McGraw Hill Professional, 2010.

[11] Bamgbade, J. A., Kamaruddeen, A.M., & Nawi, M.N.M.. *"Factors Influencing Sustainable Construction among Construction Firms in Malaysia: A Preliminary Study using PLS-SEM"*. Revista Tecnica de la Facultad de Ingenieria Universidad del Zulia, Vol. 38(3), pp. 132 - 142, 2015.

[12] Nawi, M.N.M., Jalaluddin, S.M.F.W.S., Zulhumadi, F., Ibrahim, J.A. & Baharum, F. *"A Strategy for Improving Construction Projects Sustainability through Value Management Approach"*, International Journal of Applied Engineering Research, Vol. 9(24), pp. 28377–28385, 2014.